



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Samuel C. Weaver

Serial No. 09/838,866

Filed: April 20, 2001

Art Unit: 3643

Patent Examiner: Nguyen, Son T.

Our Ref: 01-211

Customer No. 30058

METAL MATRIX  
COMPOSITE HORSESHOE

Mail Stop Appeal Brief-Patents  
Commissioner for Patents  
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**APPLICANT'S REPLY BRIEF**

This appeal is to decide whether the claimed invention would be obvious to one of ordinary skill in the art considering Eom in view of Weaver. The determination of patentability is to be based on a preponderance of evidence when considering the entire record. *In re Oetiker*, 977 F.2d 1443 (Fed. Cir. 1992). With regard to rejections under 35 U.S.C. §103, the Examiner must provide evidence which as a whole shows that the legal determination sought to be proved is more probable than not. *In re Eli Lilly & Co.*, 902 F.2d 943 (Fed. Cir. 1990). In contrast to meeting this standard, the Examiner's Answer merely serves to underscore that the claimed invention is patentable over Eom in view of Weaver.

The claimed invention requires a “metal matrix composite horseshoe” that has “improved vibration damping and stiffness”. The meaning of the term "metal matrix composite" as used throughout the application is clear. The application teaches and claims that the metal matrix composite is: (1) a metal in combination with (2) a silicon boride. The metal is selected from the group of aluminum, magnesium, titanium and mixtures thereof. The silicon boride is selected from the group of silicon hexaboride and silicon tetraboride and mixtures thereof. (Appl. Pg. 2, lines 4-7, 13 and 14; and Weaver (incorporated by reference, pg. 2, lines 14, 15) Col. 1, lines 10-14; Col. 2, lines 1-6; Col. 2, lines 24-25; Col. 2, lines 53-56; Col. 2, line 65 – Col. 3, line 3; Col. 3, lines 14-18).

#### **Examiner's Misconstruction of the Claimed Invention**

The Examiner's Answer demonstrates that the rejection of the claims in this case is based on a fundamental misconstruction of the plain meaning of the words that describe and claim the Applicant's invention. In the claims and throughout the specification, the Applicant describes the invention as a horseshoe that is made from a "metal matrix composite". To support the rejection under §103, the Examiner conjectures that "metal matrix composites" are the same as "metal alloys". Indeed, the Examiner admits that she uses "metal alloy" interchangeably with "metal matrix composites". (Examiner's Answer, pg. 3, lines 12-13). However, nothing in the application or any of the references suggests such an equivalency. On the contrary, the file history clearly demonstrates that those terms have very different meanings and are not interchangeable!

The application consistently describes the material of the claimed horseshoe as a "metal matrix composite." The term "metal matrix composite" is used in the specification and claims 13 times. The application never describes the material of the claimed horseshoe as a pure metal or as a metal alloy. As known to those of ordinary skill in the art, a "metal matrix composite" is a metallic matrix in combination with a physical reinforcing constituent. In contrast, in metal alloys, the alloy's atoms combine with the parent metal's crystal lattice. Weaver Decl. ¶¶ 8-18<sup>1</sup>, Response to Official Action, pp. 2, 3<sup>2</sup>, Introduction to Metal Matrix Composites<sup>3</sup>, The Structure of Metal, pp. 1-3<sup>4</sup>, and Appeal Brief, p. 8. Thus, those skilled in the art recognize that in metal alloys the alloy and the parent metal combine at the atomic level whereas in metal matrix composites, the reinforcing constituent does not combine with the metal matrix at the atomic level.

In opposition to this body of information, the Examiner offers an unsupported assertion that "metal matrix composite" is defined as a "material that is formed by a molten metal selected from aluminum, magnesium, titanium and mixtures thereof". She claims to rely on the specification for this conclusion. (Examiner's Answer, pg. 4, lines 1-4). This is plain error. The Application defines the "metal matrix composite" as the combination of (1) a metal selected from the group of aluminum, magnesium, titanium and mixtures thereof with (2) silicon boride selected from the group of silicon hexaboride and silicon tetraboride. (Appl. Pg. 2, lines 4-7, 13 and 14; and Weaver (incorporated by reference, pg. 2, lines 14, 15) Col. 1, lines 10-14; Col. 2,

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<sup>1</sup> Declaration of Samuel C. Weaver dated August 21, 2003 (herein cited as "Weaver Decl. ¶ \_\_\_\_").

<sup>2</sup> Applicant's Response to Official Action dated August 22, 2003.

<sup>3</sup> "An Introduction to Metal Matrix Composites," T.W. Clyne and P.J. Withers, pp. 1-70, Cambridge University Press, 1993.

<sup>4</sup> "The Structure of Metal," Bob Capudean, The Fabricator.com, April 24, 2003.

lines 1-6; Col. 2, lines 24-25; Col. 2, lines 53-56; Col. 2, line 65 – Col. 3, line 3; Col. 3, lines 14-18).

The application's use of "metal matrix composite" is totally consistent with the meaning of that term as used in the art. The Examiner's statement is directly opposed to the use of that term as it is understood in the art. It has no support in the record and is without merit. The argument that the term "metal alloy" is interchangeable with "metal matrix composite" is not based on any reasonable construction of any language in the application or the file history and is contrary to information generally known to those skilled in the art. The Examiner's Answer does not (and cannot) cite any portion of the application to support such a contention.

In addition to the fact that the Examiner's equivalency of "metal matrix composite" with "metal alloy" is contrary to the application, the Examiner's position also ignores Weaver's Declaration, the Response to Official Action, the reference entitled "Introduction to Metal Matrix Composites" and the reference entitled "The Structure of Metal". All of those documents explain that it was known in the art that "metal matrix composites" are different than "metal alloys".

The decision on patentability must be made upon consideration of all the evidence, including the evidence submitted by the Applicant. *In re Eli Lilly & Co.*, 902 F.2d 943 (Fed. Cir. 1990). In *In re McLaughlin*, 443 F.2d 1392 (CCPA 1971) (cited in Examiner's Answer), the CCPA reversed the Board and allowed a claim for which the Applicant had submitted a supporting affidavit. The Court found that it is "imperative" that such affidavits be evaluated in determining whether the claimed invention was unpatentable under §103. *McLaughlin* @ 1395. However, instead of citing the record in this Appeal, the Examiner mischaracterizes the specification and ignores the remainder of a file history that further explains that metal matrix

composites are not metals and are not metal alloys. (Weaver Decl. ¶11, The Structure of Metal; and An Introduction to Metal Matrix Composites).

**Examiner's Combination of Eom and Weaver Fails to Produce the Claimed Invention**

The Examiner's proposed combination of references relies principally on the metal alloy of Eom. (Examiner's Answer, pg. 3, lines 19-22). Eom describes a horseshoe that is made of an Al-Mg alloy. Eom selected that alloy because it is said to be ductile and shock absorbing. To make the horseshoe more abrasion resistant, Eom limits Mg content and adds Zn. (Eom, Col. 2, line 16-21). Eom describes the horseshoe as an "alloy" or "alloy metal" fourteen times. Never once does Eom indicate that the horseshoe could be a "metal matrix composite" material.

The Examiner proposes to add to Eom's metal alloy the further ingredient of silicon boride. (Examiner's Answer, pg. 4, lines 10-14). Weaver is cited as teaching that silicon boride can be added to molten metal. (Examiner's Answer, pg. 4, lines 6-9). Eom does not describe or suggest the use of a metal matrix composite. Eom is directed to a horseshoe that is made of a metal alloy. Thus, the Examiner proposes to combine Eom and Weaver so as to produce a horseshoe made of a metal alloy that includes silicon boride.

However, Claim 1 does not require a metal alloy. Claim 1 requires a metal matrix composite which, as explained extensively in the file history of this application, is not a metal alloy. (Appeal Brief, pg. 8; Response to Official Action, pp. 2-3, Introduction to Metal Matrix Composites; The Structure of Metal; and Weaver Decl. ¶¶ 10, 11). Therefore, even if Eom and Weaver could be properly combined as the Examiner proposes, that combination yields a metal

alloy and not a metal matrix composite. Thus, the Examiner's combination of Eom and Weaver does not produce the claimed invention!

### **The Combination of Eom and Weaver is Improper**

To prevent hindsight reconstruction of various elements that might exist, the Federal Circuit requires rigorous application of the tests regarding whether references should be combined. Thus, the law requires the existence of some teaching, suggestion, reason or motivation to combine prior art references. *McGinley v. Franklin Sports, Inc.* 262 F.3d 1339 (Fed. Cir. 2001). The mere level of skill in the art cannot be relied upon to provide the suggestion to combine references. *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308 (Fed. Cir. 1999).

The Examiner admits that she relied on hindsight reasoning in rejecting the claims. (Examiner's Answer, pg. 6, lines 10-13). Still, she argues that one of ordinary skill in the art would have been led to modify Eom by adding silicon boride material according to Weaver for the purpose of making the horseshoe "stronger". (Examiner's Answer, pg. 4, lines 7-14). Claim 1 requires a horseshoe having improved properties of "vibration damping and "stiffness". The Examiner's argument for a motivation to combine Eom and Weaver necessarily (but incorrectly) equates properties of "vibration damping" and "stiffness" with the property of "strength".

"Vibration damping" and "stiffness" of a material are not the same properties as "strength" of a material. The Examiner offers nothing to support the notion that those properties are equivalent. Yet, the Examiner's Answer asserts, without explanation, that one seeking improved "vibration damping" and "stiffness" would base their selection on a different property -

material "strength". This argument illogically ignores all differences between properties of "vibration damping," "stiffness" and "strength".

Furthermore, the Examiner's proposed combination is against the teachings of Eom. A prior art reference must be considered as a whole, including portions that tend to lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540 (Fed. Cir. 1983, cert denied, 469 U.S. 851 (1984)). Eom does not suggest that the horseshoe needs greater strength. On the contrary, Eom teaches the substitution of a metal horseshoe with an Al-Mg alloy in order to develop a lighter, more ductile, shock absorptive, and abrasion resistant horseshoe. Nothing in Eom suggests that the metal alloy described therein is intended to make the horseshoe stronger. On the contrary, Eom teaches to make the horseshoe softer. Clearly, one skilled in the art would not look to Weaver to strengthen the horseshoe of Eom when Eom is proposing an alloy that makes the metal softer not stronger.

Looking to the teachings of Weaver to provide a horseshoe with improved properties of "vibration damping" and "stiffness" can only be based on the teachings of the Applicant. The Examiner contends that she did not rely on information that was "gleaned only from the applicant's disclosure." However, the only description of a metal matrix composite as claimed in Claim 1 with improved "vibration damping" and "stiffness" is found in the Applicant's own specification. Such teachings are not found in either Eom or Weaver. Indeed, the Examiner concedes that no such teaching is found in Weaver. (Examiner's Answer, pg. 6, lines 21, 22). Combining Eom and Weaver does not somehow produce teachings that are not found in either reference individually.

### **Examiner's Inherency Argument**

The Applicant has explained that at the time the invention was made the performance of the metal matrix composite horseshoe was surprising. The performance was surprising because the "vibration damping" characteristic of the metal matrix composite was unknown at the time of Eom and Weaver. (Weaver Decl. ¶¶ 4-9, 13-19). The "vibration damping" property was discovered by the Applicant at a later time. (Appeal Brief, pp. 17, 18; Weaver Decl. ¶¶ 9, 14, 15, 16, 17). In reply, the Examiner speculates that the stiffness characteristic must have been expected because it is inherent in the metal matrix material. (Examiner's Answer, pg. 5, lines 13, 14).

The knowledge in the prior art at the time the invention was made does not support the Examiner's conclusion that it would be obvious to combine Weaver with Eom to arrive at a horseshoe that provides better stiffness and vibration damping. Obviousness cannot be predicated on what is not known at the time an invention is made, even if the inherency of a certain feature is later established. *In re Rijckaert*, 9 F.3d 1531 (Fed. Cir. 1993). In the subject application, the vibration damping property of the metal matrix composite was unknown and could not have been reliably predicted. (Weaver Decl. ¶¶ 9-16). The only way of ascertaining the vibration damping property was by experimentation. (Weaver Decl. ¶¶ 14, 15, 16). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re. Mills*, 916 F.2d 680 (Fed. Cir. 1990). The Examiner offers no explanation as to why anyone skilled in the art would attempt to substitute Weaver when it was not known at the time that the material described in Weaver afforded greater vibration damping. Instead, the Examiner presumes that



the "vibration damping" should have been anticipated. However, this is contrary to the facts of record which show that the vibration was not known and that one normally skilled in the art could not properly assume its existence. (Weaver Decl. ¶¶ 8-16).

Ultimately, the Examiner's contention seems to be that one skilled in the art would be expected to randomly substitute various materials into Eom until the desired result was achieved – whether or not such materials were known to have high vibration damping. This "obvious to try" approach has been rejected by the Federal Circuit. *Ecolochem, Inc. v. Southern California Edison Co.*, 227 F.3d 1361 (Fed. Cir. 2000) reh'g denied, in banc suggestion declined, (December 13, 2000) and cert. denied, 121 S. Ct. 1607 (2001).

The Examiner's inherency argument completely avoids the point at issue. The issue for decision is: "Would the Eom/Weaver combination that the Examiner proposes make the claimed invention obvious to one normally skilled in the art? "Vibration damping" and "stiffness" properties are required by the horseshoe of Claim 1. Weaver does not teach that the metal matrix composite was known to have improved stiffness and vibration damping. (Examiner's Answer, pg. 6, lines 21, 22, Weaver Decl. ¶¶ 11-14). Therefore, there is no teaching or suggestion to combine Weaver and Eom. Without such teaching or suggestion, the proposed combination is improper. Essentially, the Examiner's contention supposes that one seeking a horseshoe with improved "vibration damping" and "stiffness" would accomplish that result by substituting materials that were not known to have those properties or to produce that result. Such an absurd proposition does not make the claimed invention unpatentable.

At the time that the invention was made, there must be some reason known in the art for making the substitution based on the suitability of that material. In *re Rijckaert, supra*. The

claimed invention requires that the material have a "vibration damping" property. Prior to the time of the invention, it was not known that the material that is described in Weaver had the property of "vibration damping". (Weaver Decl, ¶¶ 14-17). Since this was not known in the art, it would not have been obvious for one skilled in the art to select the metal matrix composite of Weaver for use in the claimed horseshoe.

**Examiner's New Combination of Eom and Weaver (Disclaimed in Final Office Action)**

In the Examiner's Answer, the Examiner may be suggesting a combination of Eom and Weaver that the Examiner expressly disavowed in the Final Office Action.<sup>5</sup> The Final Official Action states "the [E]xaminer is not trying to replace the metal of Eom with the metal composition as taught by [the '607 Patent]."<sup>6</sup> "The [E]xaminer is not replacing the already known aluminum."<sup>7</sup>

In what may be an assertion of the combination that was expressly denied in the Final Official Action, the Examiner now may be substituting the metal alloy of Eom with the metal matrix composite of Weaver. (Examiner's Answer, pg. 4, lines 14-20). The Examiner declares that it would have been an obvious design choice to substitute the metal matrix composite of Weaver on the basis of its suitability for the intended use.

This argument also fails. It would not have been obvious to combine Eom and Weaver to secure a horseshoe with improved vibration damping and stiffness because Eom and Weaver do not describe vibration damping and stiffness as selection criteria for horseshoes. Furthermore,

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<sup>5</sup> Official Action dated November 21, 2003.

<sup>6</sup> Final Office Action, pg. 5, lines 16, 17.

<sup>7</sup> Final Office Action, pg. 6, lines 16-18.

the materials in Eom and Weaver are not described as having stiffness and vibration damping. The only teaching that would suggest the use of the metal matrix composite is the Applicant's own teachings. However, those are not available to support the Examiner's obviousness theory.

### **Miscellaneous Comments in Examiner's Answer**

The Examiner seems to contend that the Applicant never offered a technical explanation as to how the metal matrix material affords greater stiffness and, therefore, that result cannot be considered unexpected. (Examiner's Answer, pg. 5, lines 15-17). No authority is cited for this novel proposition. This notion stands the whole concept of inventiveness on its head and is clearly not the law. A newly identified property of a material that was previously unknown does not somehow become expected unless the property can be explained. Indeed, the novelty of many inventions is underscored by the fact that they cannot be explained.

Also, the Examiner urges that replacing Eom's metal alloy with Weaver's metal matrix composite does not change the performance of Eom's horseshoe. (Examiner's Answer, pg. 6, lines 1-4). This appears to argue against a motivation for making the combination at all and contends that even if the combination were made, it would not produce the claimed result! This amounts to nothing more than further evidence of the Examiner's failure to understand the meaning of "metal matrix composite."

### **Conclusion**

The Examiner's Answer concedes that the Examiner draws no distinction between metal matrix composites and metal alloys. While the Examiner makes no such distinction, the

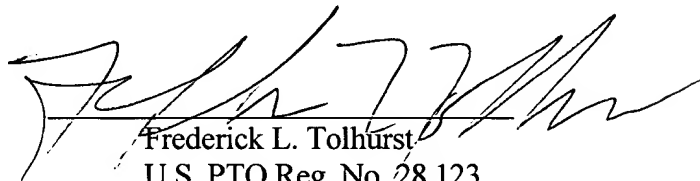
differences are well known to those skilled in the art. The record of this application amply demonstrates this fact. The Official Action cannot properly support a rejection of the claims that is based essentially on a refusal to acknowledge knowledge in the art that has been specifically documented in this record.

Accordingly, allowance of Claims 1-16 is respectfully requested.

The Commissioner is hereby authorized to charge Deposit Account No. 03-2026 for any fees associated with this Reply Brief.

Respectfully submitted,

By:

A handwritten signature in black ink, appearing to read 'Frederick L. Tolhurst', written over a horizontal line.

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